

**What is claimed is:**

1. A computer data signal embodied in a carrier wave for a micromagnetization analysis and used to  
5 direct a computer to perform the processes of:

receiving an input of a parameter of a micromagnetization vector assigned to a center of a divided microelement of an area to be analyzed, and a parameter of vector potential assigned to a side  
10 or node of the microelement;

generating a magnetic field equation for providing an external magnetic field for micromagnetization using the input parameters, and initializing a time;

15 obtaining a solution of the magnetic field equation;

obtaining a time integral of the LLG equation using the solution as an external magnetic field for an unstationary LLG equation;

20 determining whether or not micromagnetization obtained by the time integral satisfies a convergence condition;

correcting the magnetic field equation using the obtained micromagnetization when the  
25 convergence condition is not satisfied, and

stepwise increasing the time; and

repeating the process of obtaining a solution of the magnetic field equation and subsequent processes.

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2. The signal according to claim 1, further comprising a process of

obtaining a magnetic field using the micromagnetization obtained by the time integral of  
10 the LLG equation when the convergence condition is satisfied.

3. The signal according to claim 1, wherein said magnetic field equation is a stationary  
15 magnetic field equation using vector potential.

4. The signal according to claim 1, wherein said magnetic field equation is an unstationary magnetic field equation.

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5. The signal according to claim 1, wherein in the process of obtaining the time integral of the LLG equation, a product of a difference between micromagnetization vector assigned to a  
25 target element and micromagnetization vector

assigned to an adjacent element and an exchange interaction coefficient is set as an exchanged magnetic field by an exchange interaction with the adjacent element.

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6. The signal according to claim 5, wherein  
when an exchange interaction coefficient for the adjacent element is different from an exchange interaction coefficient for the target element,  
10 then an average value is used as an exchange interaction coefficient in the product.

7. The signal according to claim 1, wherein  
in the process of obtaining a time integral of  
15 the LLG equation, as an exchanged magnetic field for an element contacting a boundary of an element group formed by a plurality of elements, there is set a product of an externally specified one of an exchange interaction coefficient assigned to the  
20 boundary and an exchange interaction coefficient assigned to the element group, and a difference between micromagnetization vector assigned to a target element and micromagnetization vector assigned to an adjacent element.

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8. The signal according to claim 1, wherein

in the process of obtaining a time integral of the LLG equation, for an element contacting a boundary of an element group formed by a plurality of elements, a value of an exchanged magnetic field is set using either an externally received input value of an exchanged magnetic field assigned to the boundary, or an input value of an exchange interaction coefficient which depend on a size of an element and which is multiplied by the different between micromagnetization vector assigned to a target element and micromagnetization vector assigned to an adjacent element to obtain the exchanged magnetic field.

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9. A micromagnetization analyzing apparatus, comprising:

an input unit receiving an input of a parameter of a micromagnetization vector assigned to a center of a divided microelement of an area to be analyzed, and a parameter of vector potential assigned to a side or node of the microelement;

a magnetic field equation generation unit generating a magnetic field equation for providing an external magnetic field for micromagnetization

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using the input parameters, and initializing a time;

a unit obtaining a solution of the magnetic field equation;

5 a unit obtaining a time integral of the LLG equation using the solution as an external magnetic field for an unstationary LLG equation;

a convergence condition determination unit determining whether or not micromagnetization  
10 obtained by the time integral satisfies a convergence condition;

a magnetic field equation correction unit correcting the magnetic field equation using the obtained micromagnetization when the convergence  
15 condition is not satisfied, and stepwise increasing the time; and

a control unit repeating the operation of said unit obtaining a solution of the magnetic field equation and subsequent units using the corrected  
20 magnetic field equation.

10. The apparatus according to claim 9, further comprising

a magnetic field calculation unit obtaining a  
25 magnetic field by micromagnetization using

micromagnetization obtained by the time integral of the LLG equation when the convergence condition is satisfied.

- 5 11. A micromagnetization analyzing apparatus, comprising:

input unit means for receiving an input of a parameter of a micromagnetization vector assigned to a center of a divided microelement of an area to  
10 be analyzed, and a parameter of vector potential assigned to a side or node of the microelement;

magnetic field equation generation means for generating a magnetic field equation for providing an external magnetic field for micromagnetization  
15 using the input parameters, and initializing a time;

means for obtaining a solution of the magnetic field equation;

means for obtaining a time integral of the LLG  
20 equation using the solution as an external magnetic field for an unstationary LLG equation;

convergence condition determination means for determining whether or not micromagnetization obtained by the time integral satisfies a  
25 convergence condition;

magnetic field equation correction means for correcting the magnetic field equation using the obtained micromagnetization when the convergence condition is not satisfied, and stepwise increasing  
5 the time; and

control means for repeating the operation of said means obtaining a solution of the magnetic field equation and subsequent means using the corrected magnetic field equation.

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12. The apparatus according to claim 9, wherein said magnetic field equation is a stationary magnetic field equation using vector potential.

15 13. The apparatus according to claim 9, wherein said magnetic field equation is an unstationary magnetic field equation.

14. The apparatus according to claim 9, wherein  
20 the unit obtaining the time integral of the LLG equation sets a product of a difference between micromagnetization vector assigned to a target element and micromagnetization vector assigned to an adjacent element and an exchange interaction  
25 coefficient is set as an exchanged magnetic field

by an exchange interaction with the adjacent element.

15. The apparatus according to claim 14, wherein  
5 when an exchange interaction coefficient for the adjacent element is different from an exchange interaction coefficient for the target element, then an average value is used as an exchange interaction coefficient in the product.

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16. The signal according to claim 9, wherein  
the unit obtaining the time integral of the LLG equation sets a product of an externally specified one of an exchange interaction  
15 coefficient assigned to a boundary of an element group formed by a plurality of elements and an exchange interaction coefficient assigned to the element group, and a difference between  
micromagnetization vector assigned to a target  
20 element and micromagnetization vector assigned to an adjacent element as an exchanged magnetic field for an element contacting the boundary.

17. The apparatus according to claim 9, wherein  
25 the unit obtaining the time integral of the



LLG equation, for an element contacting a boundary of an element group formed by a plurality of elements, sets a value of an exchanged magnetic field by using either an externally received input value of an exchanged magnetic field assigned to the boundary, or an input value of an exchange interaction coefficient which depend on a size of an element and which is multiplied by the different between micromagnetization vector assigned to a target element and micromagnetization vector assigned to an adjacent element to obtain the exchanged magnetic field.